

MATERIALS OF CONSTRUCTION
OF THE
VEGETABLE AND MINERAL KINGDOM
OF THE STATE OF VERACRUZ
& PARTICULARLY
THE COUNTY OF CORDOBA.

MEXICO

PRINTING OFFICE OF THE DEPARTMENT OF PUBLIC WORKS
San Andres St. n° 15.

• 1893

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Materials of construction of the Vegetable and Mineral Kingdom of the State of Veracruz and particularly the County of Cordoba.

1. *Fabaceæ*.—Robinia sp? Vernacular name *Cocuitl*. Another similar species called Javi with darker purple flowers grows near the coast of the Gulf of Mexico, having similar size, leaves and properties.

Trees 40 to 50 feet high with a brown rough bark, slit longitudinally and growing in a crooked manner, and covered with a number of roundish knobs along the whole stem. Leaves deciduous, pinnate with prickly spines (hooks) at their bases, each leaf bearing from 6 to 10 pair of leaflets terminated by an odd one.

Their flowers are produced from the leaf-axils in pendulous racemes, are purple and of splendid effect; form flat thin shelled pods, containing from 5 to 8 seeds.

The flower buds, the same as those of *Erythrina corallodendron*, are eaten as a vegetable and have an agreeable taste.

Both these trees give the most durable timber, so far known. It will last underground for centuries and may be used for any work, where toughness, elasticity, durability and hardness is required.

As the logs are never very straight: its timber is used for posts, axle-trees, railway sleepers, windlasses and, lastly, for fencing in a green state with the bark on, when the posts will spoout, being

admirably adapted for wire fences. The colour of the wood is brownish yellow.

2. *Fabaceæ*.—*Papilionaceæ*, sp? *Escuahuitl*. A tree from 30 to 40 feet high, with a whitish grey bark much split and generally crooked stem. Leaves pinnate with small elliptic leaflets, each leaf containing from 6 to 10 pairs of leaflets. Flowers in large erect panicles of yellow colour, furnishing three inch long transparent roundish pods, like a bladder, containing from 4 to 6 seeds each.

3. *Fabaceæ*.—*Papilionaceæ*, sp? *Escuahuitl de Savana*. Is much smaller, than the former, with similar leaves and flowers, but the bark of its stem cracks very deeply and being porous like cookbark, may be used for corks. Used for cabinet work and posts.

4. *Fabaceæ*.—*Piscidia*, sp? Called Biterwood (amargoso). A tall stately tree 80 to 100 feet high with a white smooth bark. Leaves pinnate, hairy and much veined; flowers in risps of dark purple colour and making a splendid effect. Its wood is brown. very tough, fine grained, but exposed to the weather not lasting, Gives long straight beams for use under shade; is also employed for furniture. Its leaves and bark are employed to poison fish and in small doses as a tonic.

5. *Fabaceæ*.—*Papilionaceæ*, *Myrospermum Pereiræ* (Royle), *Myroxylon Pereiræ* (Valotzsch). Balsamo, a dark red wood, very compact and durable. A beautiful 80 to 100 feet high tree, with greyish white, smooth bark, which peels off annually. Leaves unequally pinnate, of glossy lustre on the upper side with pellucid dots, flowers axillary and terminal of a light rose colour, with a papilionaceous corolla. The fruit is winged, indehiscent and is borne on a short stalk. The kernel of the fruit contains one to two drops of balsamic oil and the balsam of its wood might be obtained by the same process, as of *Myroxylon peruiferum* and *M. toluifera* by separating part of the bark and burning the exposed parts with torches, as done in San Salvador, but the experiment has never been tried here.

The timber, which has a strong balsamic rather disagreeable odour, is one of the hardest known and is used by wheelwrights for felloes, axle-trees, cartshafts; as beams in constructions, they are imperishable. As railroad sleepers, they will last for a number of years and not be affected by rot and change of temperature.

6. *Fabaceæ*.—Papilionacæ, *Myrospermum* sp? Balsamo with yellow wood. This splendid tree is very rare, with a stem of 4 to 5 feet diameter, has a rough and much cracked bark of a bluish colour and yellow, compact durable timber.

It is a wide-spreading tree of a height from 60 to 80 feet with beautiful foliage, unequally pinnate. Each leaf is half a yard long, composed of from 10 to 12 leaflets, which are slightly serrated.

The fruit is much larger than of *M. Pereiræ*, winged, 3 inches long and contains a kernel on its upper extremity, in which is contained a drop of oil in a little bag. The timber is very durable and may be employed for any work which requires elasticity and durability.

A large quantity of transparent white gum exudes from the bark of the tree, similar in all respects to arabic gum.

7. *Fabaceæ*.—Papilionacæ, *Myrospermum peruiferum*, Linn. Balsam of Peru. I only mention this species, being found rarely in the barrancas of Tierra Caliente. It appears, that on account of its fine aroma, it was used as incense in the religious ceremonies of the Aztecs and later by the catholic priests, until all the trees were extinguished.

8. *Fabaceæ*.—Cæsalpinieæ, *Hymenæ* Courbaril (*Guapinole*). A large wide-spreading tree 80 to 100 feet high, with whitish bark, the outer rim of which peels off every year; it attains a great age and large diameter at its base, from 2 to 3 yards. Its flowers have a woody tubular calyx with two bracts at the base and are in corymbs of 2 inches long rosecoloured flowers. The fruit, forms a pod with a hard woody shell, containing a brown sweet powdery pulp, eaten by the natives. Its leaves are in pairs, whence the name *Hymenea*.

The timber is of a brown colour, tolerably closegrained and used in construction as rafters and beams.

9. *Fabaceæ*.—*Atelia*, sp? Guayacan. But not to be mistaken for *Guaiacum officinale*, which a quite distinct tree.

A fine straight growing tree 40 to 50 feet high, of a dark grey bark, whose outer pellicle easily peels off, showing an inner bark of a dark green colour.

Flowers in risps of a dirty yellow colour; pods from 1 to $1\frac{1}{2}$ inches long, containing each 2 or 3 winged seeds. Its inner bark which at first has a sweetish taste becomes intensely bitter and is employed as a powerful tonic.

Its timber is very heavy, of a blackish colour and very durable. It makes everlasting good posts and being crossgrained is employed by the wheelwright for every purpose, where an elastic and lasting wood is required.

10. *Fabaceæ*.—*Cæsalpinia crista*, Palo de Brasil, Brasilwood. Is too well known to need a description. As there has been a large demand for it, all larger trees have been cut down and only young plants remain in reduced numbers.

11. *Fabaceæ*.—*Cæsalpineæ*, *Tamarindus indica*. Tamarind. A beautiful wide spreading tree, 40 to 50 feet high. Is cultivated for its pods, which contain an agreeable acid pulp. Its timber, although not close grained is employed for building purposes.

12. *Fabaceæ*.—*Cæsalpineæ*, *Poinciana regia* (Flambeau). Has been introduced from Madagascar. A fast grower and wide spreading tree. Flowers very large in terminal racemes, incomparable to any other tree for splendid effect, they are orange and purple.

Leaves dark green, bipinnate. On the coast, the tree flowers bereft of leaves, but in more temperate climates as Cordoba, it flowers with its leaves on.

13. *Fabaceæ*.—*Mimoseæ*, *Albizzia Saman* (*Pithecolobium Saman*). Nacastle, a very large and wide spreading tree, height from 50 to 60 feet, diameter of trunk, sometimes 3 to 4 yards;

a fast grower; wood light and under roof durable, but will not stand exposure to the weather.

Large canoes are hollowed out of its trunk.

Too common furniture it is well adaptedly being light and of brownish colour. Its foliage is similar to *Poinciana regia*, giving a wide spreading shade.

The fleshy (pulpy) part of its fruit contains saponaceous qualities, used by washerwomen for lack of soap.

14. *Fabaceæ*.—*Mimoseæ*, *Mora excelsa* (*Granadillo*). A large tree 60 to 80 feet high with bipinnate, beautiful foliage of a dark green colour. Its pods are of scarlet colour, spirally twisted and split into two halves. The seeds are of a glossy dark black, twice the size of Mexican black beans.

Several species exist, some with a sweet edible pulp, covering the bean as in *Juga* (*Cajinicuil*). All the species have dark brown timber, which being closegrained is employed for furniture, in buildings and for railroad sleepers.

But the great value of these trees consists in the immense quantity of tannin, they contain not only in the bark, but in the wood itself, which contains about 75% of tannin and is not excelled by any other timber tree yielding tanning.

15. *Fabaceæ*.—*Mimoseæ*. (*Tepehuaje*, *Huaje*, *Cañama'o*). There are about a dozen trees existing with this name, all giving closegrained timber and all more or less employed as furniture, some of them equalling mahogany. They all make durable posts and railroad ties. Their leaves are tripinnate and flowers generally white in globular heads or in spikes, containing numerous stamens either white or yellow. Their pods are more or less employed as tanning material and do not split, but fall off from the tree entire.

These trees are found from the seacoast to the height of 6,000 feet above the level of the Ocean, but are more abundant in the hotter parts of the State of Veracruz. Their bark contains large quantities of tannin.

16. *Fabaceæ*.—*Mimoseæ*, *Prosopis* different species. (*Huizache*,

Mezquite). Of this genus there exists a great number of species, all more or less useful, as producing gum, tannin and timber. The gum is equal to arabic gum, but although abundant, never are collected. The dividivi, exported in large quantities from South America, is one of its products.

All of them are small trees, not exceeding in height from 15 to 30 feet, most of them armed with thorns or prickles, bi and tripinnate leaves and a wide spreading shade. Their flowers are collected in globular heads, of a yellow colour and sweet scented. Their timber is a dark brown, containing much tannin, fine grained, very elastic and sometimes used for furniture.

17. *Fabaceæ*.—*Cassia fistula*. Sessé and Mociño (*Quauhayolmatli*). Differs from the real cassia fistula in having shorter pods and having a strong aromatic odour. The tree is called here, *árbol de vainilla*, Vanilla tree, and has been named by use, many years ago as Cassia Vanilla.

Its foliage is pinnate, composed of from 10 to 12 pair of leaflets. Its racemes of large yellow flowers make a splendid effect and perfume the whole neighbourhood. Its pods are from 12 to 15 inches long of a glossy black colour and rounded, have a strong aromatic odour and a sweet taste. A tree 40 to 50 feet high with widespreading branches and dark red timber, which is not very lasting but very tough and used for different purposes, as axe-handles, felloes, axle-trees, also for furniture.

18. *Sapotaceæ*.—*Ochras ovifera* (*Cozahuico*). A lofty evergreen tree 60 to 80 feet high with a smooth whitish bark, having oval scales, which peel off. Leaves 4 to 5 inches long, ovate, lanceolate; flowers greenish yellow, solitaires, succeeded by eggshaped yellow fruits with dark purple binge, the size of a hen's egg; the outerrind of which is milky and very astringent, containing caoutchouc. The pulp of the fruit is sweet, of a good taste; the seeds are large, solitary, ovate and of dark glossy chesnut colour.

Its timber is yellow, very compact, crossgrained and of great durability, lasting for centuries. It is especially used in the cons-

truction of wooden bridges and may be used in any work, where durability and strength is required.

19. *Sapotaceæ*.—*Sapota achras* (*Chictzapottl*). This is one of the most useful and at the sametime most beautiful evergreen trees of the country. Height from 80 to 130 feet. Bark rough of a bluish tint, split longitudinally, emitting on incision a gum, called *chictle*, from which the name of *chictzapottl* and not *chico zapote* (small zapote), as it is generally called here. This *chictle* (chicle) is a kind of gutta-percha and when burnt, of an aromatic odour.

Leaves in the wild species from 8 to 10 inches long and from 2 to 2½ wide; flowers terminal and axillary, small and of a whitish colour. Fruit the size of a peach or rather smaller in the wild species; but much larger in the cultivated. The leaves of the latter are only half the size of the former and not so dark and glossy. Each fruit contains from 4 to 6 black, flat, shining seeds, which are covered with a thin sheet of white *chictle*, one of the most aromatic incenses so far known.

Its very heavy, imperishable dark red timber is of great value. Beams of large size for the construction of bridges or buildings bring always a good prize; for railroad sleepers it is excellent, in proof of which the Mexican Railway Company has used on its line from Veracruz to Esperanza more than 100,000 of these trees. It lasts for centuries in under ground work.

20. *Sapotaceæ*.—*Chrysophyllum monopyrenum* (*Ojotzin*). A tree with a splendid dark green foliage 50 to 60 feet high. Leaves alternate, entire, ovate lanceolate with numerous transverse closely aggregated ribs and golden hairs on the under surface. It has a milky juice.

Corolla campanulate, its tube bearing five fertile stamens and no steriles. The fruit is a berry with ten cells or only one from the suppression of the rest and has a sweet and agreeable taste. Its leaves are greedily eaten by cows and horses, being of great service in the dry season, when most pastures are dried up.

Its timber is dark red, closegrained and used for all building

purposes, where durability and strength is required. For railroad ties, it is very lasting.

21. *Apocynæe*.—*Thevetia Yocotli* (*Yoyote*.)

Apocynæe. *Thevetia nerifolia*. (Soliman). Small evergreen trees from 20 to 30 feet high, its trunk acquiring a diameter of from 9 to 12 inches. Leaves alternate, narrow, lanceolate; cymes terminal with campanulate yellow flowers. Fruit, round, fleshy, containing a hard stony seed, divided into two cells, each of them containing two slightly winged seeds.

Every part of the tree, contains a poisonous milky juice, but the endocarp produces a poison similar to strychnine. Its sap wood is white and finegrained and proper for inlaying. Its heart wood is dark black, not heavy and makes good veneers, equal to the best ebony.

22. *Cordiaceæ*.—*Cordia Sebestena* (*Copitl*). An evergreen tree, 40 to 50 feet high. Leaves cordate, acuminate, very rough and used in polishing. Flowers large, bell-shaped, of an orange colour in terminal clusters. Fruit, pear-shaped of the form of a middle sized pear, inclosing a hard seed of similar shape. The fleshy part of the fruit is preserved in sugar and makes a good preserve.

Its timber is either dark black or black with yellow streaks, very closegrained giving splendid veneers, equal to the best ebony.

23. *Cordiaceæ*.—*Cordia odoratissima* (*Xochitlcuahuitl*). Literally a tree of flowers, so called by the Aztecs for the excellent aroma of its flowers and particularly of its wood, which has the odour of Cologne water.

An evergreen tree 50 to 60 feet high; diameter of trunk from 25 to 30 inches. Leaves alternate, rough; flowers in large terminal cymes white and sweet scented; fruit a small berry. Its timber is of a greyish black colour and when of a certain age of great durability. Is much used for beams, rafters, etc., in the construction of houses.

24. *Bignoniaceæ*.—*Tecoma pentaphylla* and *T. quinquefolia* (*Maquile*). Which is the meaning of the number five; the division

of the lobes of its leaves being five lobed. The Spaniards gave it the name of roble, its wood being somewhat similar to an oak in Spain called "roble," probably *Quercus robur*.

A splendid deciduous tree only about 40 feet high, but attains the height of 80 feet on calcareous mountains, is widespreading; its leaves are large and glossy on the upper surface.

Bark grey, much cracked in larged trees. Its flowers in March and April, after shedding its leaves, of a white colour with a tinge of rose or of a light purple, according to the situation on which the tree is found.

Flowers bell-shaped, from 3 to $3\frac{1}{2}$ inches long; the tree being literally covered with them, making a splendid efect. Pods narrow, 12 to 15 inches long; seeds flat and winged. Its timber, which has the appearance of oak is not heavy and easily worked, is durable and used for many purposes.

25. *Bignoniaceæ*.—*Tecoma triphylla*. Called *flor de dia*, which means flowers lasting only one day. Its wood ressembles Guaiacum timber, for which reason it is also called Guayacan. A deciduous tree 30 to 50 feet high with greyish bark, much cracked; its leaves are three-lobed, wrinkled; flowers axillary and terminal, in clusters, of a saffran colour and exempt of leaves when flowering. Pods 12 to 15 inches long opening longitudinally; seeds flat and winged. The timber is nearly black and almost imperishable; makes excellent posts, which last for centuries. Along the coast, where the tree is more abundant, the inhabitants believe that this timber is converted into stone and iron (is petrified).

26. *Bignoniaceæ*.—*Tecoma multiflora* (Rosadillo, Rosewood). It is a very rare deciduous tree from 50 to 60 feet high, with a whitish grey bark: its leaves are palmate, scabrous in from 7 to 9 divisions. Flowers in terminal bunches, very numerous, half an inch long of a white and rose colour, sprinkled with yellow and purple spots. Pods $\frac{1}{4}$ of an inch in diameter and from 15 to 18 inches long.

The timber has a strong odour of *Rosa centifolia*, of yellow

colour, compact and very durable. Makes lasting posts, railroad sleepers, beams for construction and can be employed, wherever strength and durability is required.

27. *Ebenaceæ*.—*Diospyros sapota* (Zapote prieto). A beautiful fruit tree, much cultivated has a wide range from the sealevel to 5,000 feet elevation, is from 50 to 60 feet high with glossy dark green leaves and solitary whitish flowers, blue on the inside of the tube of the corolla.

Fruit round, the size of a very large orange with a thin green rind, containing a sweet pulp of chesnut colour, which turns soft and black on completely ripening and which, if mixed with sugar and lemon juice or claret makes a delicious dish. Its timber stands well under shade, but will not bear exposure to the weather and is used for many purposes.

28. *Oleincæ*.—*Fraxinus excelsior* (mexicana). Fresno (Ash). Appears to be the same, growing in the United States.

A deciduous and large tree 60 to 100 feet high with pinnate acuminate leaves; flowers in terminal racemes of a whitish colour; fruit pendulous and winged. Its timber is in great request by carpenters and wheelwhrights on account of its great elasticity.

29. *Oleincæ*. *Fraxinus trilobata*. *Zopilote* (Turkey-buzzard). A most curious deciduous tree little known, although very abundant on calcareous mountains from 6 to 7,000 feet high. Height of the tree from 80 to 120 feet with a smooth brownish bark, which annually peels off, depositing itself at the base of the trunk in large quantities, emitting on fermentation the odour of musk, whence its name *Zopilote*. It has pinnate leaves and terminal bunches of yellowish white flowers. Fruit curiously threewinged. The timber is of reddish colour and makes excellent beams and planks, is proper for any work of the wheelwright.

30. *Mirtaceæ*.—*Psidium pommiferum* (Guayaba). Of this genus there are numbers of species and varieties, all equally good as a fruit and distributed all over the country up to 5,500 feet above the level of the Ocean. Its timber is closegrained and of a reddish colour, but is very brittle and cannot withstand a heavy

strain. Height of the tree from 20 to 25 feet. Bark smooth, greyish white, peeling off continually. Flowers large, white and sweet scented of one day's duration. Fruit a large fleshy berry, containing innumerable seeds and being very abundant has a great consumption, either raw, as a preserve or in jelly.

31. *Mirtaceæ*.—*Eugenia Pimenta*. Allspice (*Pimienta de Tabasco*). Grows spontaneously in many parts of the State at altitudes of from 2 to 3,000 feet above the sea, but is never cultivated but for curiosity. The fruit is hardly ever collected, although most abundant but is imported from Europa, whence it is sent from Jamaica. The same happens with *Zingiber officinalis*, which grows here luxuriantly, but the greater part is imported from Europe in a dried state.

This is a splendid tree, growing to the height of 50 feet. Its foliage is large and of a dark glossy green and may be used the same as the dried fruit; its timber is of a light chocolate colour, but very compact and lasting. It has a smooth whitish bark as the *Psidium pommiferum* which yearly peels off. Its flowers are in racemes of a white colour and ripen in September.

Several other *Eugenia* give edible fruits as *Eugenia Jambosa*, introduced from the East Indies; others indigenous give edible berries, known here under the name of *Cerezas*; others give bitter fruits, considered as antidotes for diabetes.

32. *Anacardiaceæ*.—*Rhus tetlatin* (*Hincha huevos*—swelling of testicles). The mexican Upas tree. The meaning of *Tetlatin* in the Aztec language is "it burns." Is a deciduous tree of small size from 15 to 20 feet high, the largest diameter of its trunk not surpassing 12 inches. Its leaves are compound from 2 to 3 feet long, with serrated leaflets. Flowers in spikes, small, of blood colour and succeeded by eggshaped black berries, half an inch long and nearly as wide which are edible of an agreeable subacid taste. Its timber is finely closegrained, of a yellowish colour with purple veins. Makes beautiful veneers.

This tree, which abounds in milky juice has the property of swelling the testicles and head of those persons, who pass

near or under it, or who may touch the trunk or the leaves, to twice their natural size, particularly in the dry season, March and April, when the plant is in its full vigour. This swelling lasts generally from 2 to 3 days, subsiding afterwards of its own accord, giving much pain to the person affected.

Not all persons are liable to this infection, some may touch the trunk and leaves and taste the juice with impunity; while others only by passing near or under the tree are affected as above stated. It flowers in January and February and ripens its fruit in May and June.

33. *Anacardiaceæ*.—*Spondia purpurea*. Here in the Aztec language called *Cacahuatl*, but for shortness Cacao, the same as *Theobroma Cacao*.

This tree attains the height of from 50 to 60 feet. Its foliage is pinnate of a glossy dark green. Flowers in terminal and axillary racemes of a yellowish green colour and small. Fruit drupaceous, containing a hardshelled oily kernel. The fleshy part of the drupe is subacid, tasting like a plum, leaving an astringent taste in the throat. Its timber is dark red, very heavy, hardly to be distinguished from *Chictsapottl* (*Achoas sapota*) and very lasting. Is used for a number of purposes: as beams, rafters, sleepers, posts and by wheelwrights for felloes and axle-trees.

Several other *Spondia* give good timber but souer fruits, excepting *Spondia lutea*, which gives good edible fruits, but an useless soft timber.

34. *Meliaceæ*.—*Swietenia Mahogani*. Mahogany (*Caoba*).

A very tall, widespreading tree from 80 to 120 feet high, with compound glossy foliage, imparipinnate and axillary flowers. Fruit a five celled woody capsule, each cell containing numerous winged seeds. Its bark, which is of a dark grey is used as a febrifuge. Its timber used principally in furniture and cut up into veneers is too well known to need description.

35. *Meliaceæ*.—*Swietenia* sp? Gateado. Zebra-wood. The meaning of Gateado is streaked like a cat or tiger.

This tree is less common than mahogany, 60 to 80 feet high with imparipinnate foliage, the leaflets smaller, serrate and much pointed, having, when bruised, a strong odour of garlic. Bark, white nearly smooth, covered with oval scales which gradually peel off. Timber very hard and heavy, close grained, with dark black dots and streaks on a red ground; is superior to mahogany and has the same uses.

36. *Miliaceæ*.—*Swietenia* sp? *Teponaxtle*. So named by the Aztecs from the drums they made from this tree, which propagates sound better than other timber. Grows to the height of from 50 to 60 feet, has compound foliage with wide-spreading branches and a round head. Bark, rough of a dark brown colour, when old and of a smooth grey, when young. Flowers axillary, in pendulous clusters, greenish yellow fruit capsular. Its timber is of a dark yellow colour, with blackish streaks, closegrained and makes good furniture.

37. *Miliaceæ*.—*Swietenia* sp ? Rosadillo. (Rose Wood). A beautiful wide spreading tree, 50 to 60 feet high with dark green compound foliage and rough bark. Flowers and fruits nearly similar to the former, but timber of a dark brown colour, containing black streaks and having the odour of roses, when recently cut. Makes excellent furniture and very durable beams. Is a very rare tree.

38. *Cedrela odorata*.—Cedar (Light Mahogany). A deciduous tree from 80 to 100 feet high, having a majestic round head and generally a straight trunk. Bark of a dark grey, much cracked in older trees. Foliage compound each leaf from 15 to 18 inches long with strong alliaceous odour. Flowers in racemes, in July of yellow colour, very sweet scented. Fruit large, capsular; seeds numerous winged and much flattened.

Most of the timber used in the County of Cordoba and State of Veracruz, belongs to this tree. It was once very common but by its un moderate use is gradually destroyed. In 50

years more, there will be hardly a tree left, as nobody cultivates it, although of the easiest culture.

Its uses are multiple: being light, odorous and durable, nearly all the furniture made here is cedar. It makes splendid veneers, doors, window-shutters, fixtures and counters in stores and being still abundant is employed almost for every purpose.

There are several varieties, some with white, others with red and others with dark brown timber; but this is due to the nature of the ground or geological conformation. Near knots and at the juncture of branches, this timber is beautifully veined.

39. *Bombacæ*.—(Sterculiaceæ) *Eriodendron anfractuosum*. *Pochottl*. Also called Ceiba and Cotton tree. This splendid tree attains an immense size: 80 to 120 feet high; with a diameter of stem of from two to three meters. When young the bark is dark green, but of a lighter colour, when old; more rough and covered with spines, having a flat base. Its bark yields a strong fibre, proper for bags, coarse, cloth and paper. It belong to the Malvaceous order, having digitate glossy leaves and large white flowers, solitaires, axillary or subterminal peduncles, which are fasciculate, with a short calyx, shaped like the cup of an acorn. Its capsule contains a large number of black roundish seeds, covered by very fine, short, white filament, like silk, but too short, to be spun. Used for stuffing pillows. Its timber is light, easily worked and only employed for troughs and larges canoes.

40. *Zygophyllacæ*.—*Guajacum officinale*. (Guayacan), the real Guajacum or *Lignum vitæ*. A beautiful evergreen tree 25 to 35 feet high whit pinnate leaves and bluish flowers, having a calyx of 5 unequal segments, five stalked petals, ten stamens and a stalked 5 celled and five angled capsule.

As a medicinal plant, yielding a resin, it is too well known to need further description. It has a greenish brown, hard,

heavy wood, used for blocks and pullies, posts and for any other purpose where durability and hardness is required.

41. *Lauraceæ*.—*Persea microcarpa*. [*Tepeahuacatl*]. A large deciduous tree 60 to 80 feet high and of which exist several species having the same class of timber. Leaves narrow, lanceolate; flowers in panicles, white and very odorous. Fruit an elongated black berry $\frac{3}{8}$ of an inch long and half as wide. Bark greyish white. The heartwood of this and other congeners give closegrained, dark brown timber, equal to mahogany and used as such, wherever it is found.

42. *Ulmaceæ*.—*Sponia canescens*. Gray. [*Zempoaltecatl*]. The meaning of the latter word is "strong as 20 oaks." Height from 80 to 100 feet. Leaves compound alternate, each leaf containing 20 leaflets. Flowers terminal in large pendulous racemes, purple coloured. Fruit one celled, membranous, of purple colour, flat with numerous asperities, $\frac{1}{8}$ to $\frac{3}{16}$ of an inch long and half as wide.

Wood extremely hard, used by wheelwrights, for cart-shafts, felloes, pulleys, railroad sleepers and as beams in the construction of buildings.

The great peculiarity of this tree is to concrete its sap, contained in the timber, crystallizing in amber coloured crystals, as hard as flint, inutilizing the tools used by the workmen. Every crack or split of a felled tree gets filled with these crystals from the size of a sandgrain to the weight of an ounce.

43. *Moraceæ*.—*Morus rubra*. Moral. (Mulberry). A large tree with milky juice 40 to 60 feet high with rough much veined leaves, inconspicuous greenish flowers and dark red edible fruits. Its timber is of yellow colour, closegrained and very durable, although like all the species of the same family, furnishing durable wood, of brittle consistence. Used for beams in the construction of buildings and bridges.

44. *Moraceæ*.—*Maclura tinctoria*. Fustick. (Palo amarillo, palo Moral). A large deciduous tree 50 to 60 feet high, unarmed

with nearly entire, oblong, serrated leaves; unisexual flowers upon distinct trees, the males being in cylindrical or globular spikes and the female, forming dense globular heads which are converted in rocent aggregate fruits. Used principally as dyewood, but also used for beams and posts, which are very durable.

45. *Moraceæ*.—*Piratinera guayanensis*. Snake wood. Bois de lettres. (Nazareno). This last name, in allusion to the crucifixion of Christ, was given on account of the blood red colour of its sapwood; when recently cut, which at first form a yellowish colour turns rosecoloured, then blood red and after completely losing again of a yellowish colour. A beautiful large tree 80 to 100 feet high with milky juice and with 7 to 8 inches long, ovate lanceolate leaves. Flowers axillary on the extremity of branches of a greenish yellow colour, giving a number of red berries, which inclose each a round seed. Its heartwood, which is red, spotted and lined with curious black forms, as palms, etc., is one of the finest known and being rare, brings a very high prize.

Although the tree may have a large diameter, $\frac{7}{8}$ of the wood is sap-wood and $\frac{1}{8}$ heart wood. Is a rare tree and its timber is only used for the finest class of furniture.

46. *Styracææ*.—*Sympleces coccinea et limoncilla*. Both species beautiful timber trees with serrated foliage. Flowers in axillary clusters or racemes, with five lobed calyx, a five to ten lobed corolla, an indefinite number of stamens and a 2 to 5 celled ovary. Fruit either globular or elongated, fleshy, crowned by the lobes of the calyx and containing one or two seeds. The flowers are very fragrant. Its timber, which is durable is used for beams and rafters.

47. *Terbinthacææ*.—*Pistacia* sp? *Zacocotl*. A small tree 20 to 30 feet high, with pinnate leaves; male and female flowers on separate trees, in axillary panicles. Fruit in the form of an acorn with scarlet cupula. Fruit of a dark blue colour, fleshy, containing a one-celled seed.

Its timber is very durable, takes a fine polish and is only used for furniture.

48. *Sapotaceæ*.—*Sapota* sp? Zapotillo. A beautiful dark foliaged evergreen tree, 40 to 50 feet high. Its flowers are greenish and inconspicuous. Fruit dark green of the size and shape of an egg, containing a single large seed.

Its timber is lasting and makes good beams, rafters and railroad-sleepers.

49. *Platanaceæ*.—*Platanus occidentalis*. Alamo. Haya. (Platetree). A very large deciduous tree, attaining 60 to 80 feet height, and a thickness of trunk of from 1 to 2 metres.

It is too well known to need any farther description, being abundant in the Southern States of North America. Its timber is red and used for beams and planks, but is not much appreciated.

50. *Albiniaceæ*.—(*Balsamifluæ*) *Liquidambar styraciflua*. *Ocosottl*. Sweet Gum tree. Deciduous, from 50 to 80 feet high, with a rough bark and alternate, petiolate, stipulated, palmate leaves; unisexual flowers in catkins. Fruit round in the form of a strobilus. The tree grows very straight, at a height of from 3 to 4,000 feet, makes good beams, but will not stand exposure to wet.

51. *Juglandaceæ*.—*Juglans Columbiana*. Nogal. Walnut. One of the most useful and important timber trees of the country, being only found on calcareous mountains at a height of from 5 to 7,000 feet.

It attains a height of 80 to 100 feet, with a beautiful, serrated compound foliage, differing very little or not at all from *Juglans nigra* of the United States, of which this only appears to be a variety.

Has deciduous pinnate leaves, the leaflets much serrated and bear flowers of separate sexes on the same tree, appearing in February and March, just, before the expansion of the leaves. The fruit is a green fleshy husk, not splitting into regular divisions when ripe, but burst irregularly, ejecting the very

hard shelled two-valved nut, which is eatable. The dried green leaves are much used in baths to strengthen the roots of the hair and are considered insecticidal.

Its timber is black, light, elastic and very durable. It is employed in cabinet work equalling mahogany, also for gunstocks, rulers, musical instruments and for many other purposes.

52. *Juglandaceæ*.—*Carya olivaeformis*. Peccan tree. Nuez encarcelada. Has been introduced from Texas and Louisiana and gives abundant fruit, but never acquires such large dimensions, as in the before named States. Its timber is hard and lasting.

53. *Betulaceæ*.—*Alnus serrulata*. *Ilite*. Alder. A tree 40 to 50 feet high with lanceolate serrated leaves; flowers in catkins, female globular, as also its fruit. Its timber is orange coloured, soft; beams of it under shelter resist a long time. It makes excellent charcoal for blacksmiths.

54. *Cupuliferæ*.—Of this order, a great number of evergreen and deciduous species abound from the height of 2 to 9,000 feet above the level of the sea. Some of them only attain the height of a few feet, forming dense underwood (Chaparral) on the slopes of mountains, while others acquire very great dimensions from 80 to 100 feet high with trunks of several yards diameter. In the State of Veracruz alone about 80 species are known, although the greater part have never been described. The whole of them are very useful in constructions, others are only used as firewood and for charcoal. Those with hard durable timber generally are evergreens, although many deciduous species give durable and strong timber.

I shall enumerate only a few of them, as: *Quercus virens*-live oak. (Tesmole), of which there exist two distinct species, one with round glossy leaves, the undersurface of which is snowy white and another with oval glossy leaves. The first has yellow sapwood and the heartwood of a dark grey colour; the second has the heartwood of a yellowish colour with hardly any sap-

wood. Both attain a height of from 50 to 60 feet, are wide spreading, but never have high stems, which generally are crooked. The fibres of this timber are interlaced, twisted and can with difficulty be split. Its uses for ship-building, wheelwrights, for the confection of pullies, posts railroad-sleepers, beams for bridges are too well known and of all oaks it is the most durable and strongest.

In my latest expedition to the Mountains of Mactactlea-huitl, at a height of 7,000 feet I found several new species of live oak, growing to the height of from 100 to 120 feet with straight trunks from 25 to 30 yards clear and of a diameter of from 1 to $1\frac{1}{2}$ yards. Other deciduous oaks grow there of colossal dimensions with diameters of trunk of two and three meters.

Quercus radiata.—Encino de rayo. A tree from 40 to 50 feet high, with evergreen leaves. The wood splits with facility and makes excellent spokes and staves.

Quercus nigra.—Black oak.—With dark black wood, very compact and closegrained; takes a good polish, making fine furniture but is very heavy. Old trees produce good tinder between the layers of the wood.

Quercus sideroxylon.—On high mountains, attaining a height of 60 to 80 feet, with hard durable wood, serving for many purposes.

Quercus Jalapensis.—Encino blanco.—White Oak. 2, glaucescens; 2, obtusata; 2, pandurata; 2, rependa; 2, laurina; 2, mexicana; 2, crassipes; 2, lanceolata; 2, reticulata; 2, chrysophylla; 2, pulchella; 2, stipularis; 2, spicata; 2, crassifolia; 2, depressa; 2, ambigua; 2, confertifolia; 2, tridens; 2, acutifolia; 2, rugosa; 2, skinneri con muy grandes bellotas and many other species more or less useful for constructions, the carpenter, wheel-wright, for fuel and charcoal.

55. *Casuarineæ*.—*Casuarina equiseti folia*, C. quadrivalois. Introductions from Australia, doing exceedingly well in this

country. It is a fast grower, makes good telegraph posts and has no equal for fire wood.

56. *Myrtaceæ*.—*Eucalyptus globulus*. *E. amygdalina*, *E. citriodora* and a large number of other species succeed perfectly well in this climate, attaining some of them in 6 years the height of from 40 to 50 feet, always excepting. *E. globulus*, which species requires a colder and drier climate, as the table lands of Puebla and Mexico, where this latter grows with great luxuriance. Here in Cordoba it attains the height of 25 feet in few years with a diameter of from 5 to 7 inches and then remains stationary, while other species grow to large sizes.

This is one of the species of trees, which, if well cultivated would make the fortune of the planter in 10 to 15 years, but, as nobody here cares about propagating neither Mexican nor exotic trees, but destroying all useful timber trees, without ever replacing them. The consequence will be, that in no long term, all the fine sorts of timber will become exhausted, as did the Buffalos in the Western States of North America.

57. *Coniferæ* with termate leaves.

Pinus teocote. The torch pine, 60 to 80 feet high, supplies great quantities of turpentine and torchwood; its timber is of reddish colour and lasts for many yeards, when under roof.

Pinus patula, 80 feet high, produces good timber and large quantities of resin the same as *Pinus Llaveana*. The nuts of the latter form an article of commerce, being consumed in large quantities, as also in confectionary.

Coniferæ with five or more leaves. (*Quinæ*).

Pinus. Ayacahuite, 100 to 150 feet high, very resinous, with reddish compact timber, durable and used much in construction of buildings; this also called *guayolote* as several other species, which give reddish timber.

In general all the species of *Pinus* of this country are very useful, in the production of turpentine, tar, etc., but particularly in the construction of buildings. I enumerate here those best known although there are many species not yet described.

Pinus Hartwegii, *P. Russeliana*, *P. macrophylla*, *P. filifolia*, *P. oocarpa*, *P. Acalocahuite*, *P. Orizabæ*, *P. protuberans*, *P. Devoniana*, *P. Montezumæ*, *P. pseudostrobus*, *P. leiophylla*, *P. Apulcensis*, *P. Loudonié*.

Picea religiosa. *Oyamettl*. White Pine one of the largest and finest timbertrees of the country, growing to the height of from 125 to 175 feet. Its wood is white and soft, splits with ease and is manifoldly occupied.

Cupressus thurifera, *C. Knightiana*. (*Tlascal*) and *C. Benthami* (*teoctlale*), but generally known in the country under the name of Cedar. All of them splendid trees attaining a height of from 50 to 100 feet, producing lasting timber for construction of all kinds.

Taxodium distichum mexicanum—*Ahuehuete*.—Is a high, widespreading deciduous tree, with feathery foliage, attaining an immense size and bulk and great age. There is one near Oaxaca and others in Chapultepec as also the one at Tula, contemporary of the Noche Triste, when Hernan Cortes was obliged to fly from the City of Mexico (Tenochtitlan). Some of these Cypressus are several thousand years old. Their timber stands well under water and is of great durability. These trees always grow in the neighbourhood of water, near a river or brook.

Juniperus mexicana. (Sabino). Grows to the height of from 20 to 30 feet, of slow growth, but gives excellent timber of a red colour, which takes a fine polish. Used for smaller furniture and particularly as firewood.

Araucaria imbricata, *A. Brasiliensis*, South American species, which have been introduced here, as also *Araucaria excelsa*, *A. Cookii*, *A. Bidwilli*, *A. Cunninghami* and others, the latter some from the Australasian and others from the Pacific Islands. They all make splendid, ornamental trees, of quick growth and produce durable timber.

These plants as also the many species of *Eucalyptus* ought to be introduced in large quantities and planted all over the

country, as the trees will grow well in Tierra templada and Tierra fria and are of great use and grow very fast.

58. Several leaves of Agave, particularly those with large leaves are used in thatching the shanties of the poorer class of people on the table-lands, as also the flower stems of the same for poles and fences.

59. *Cactaceæ*.—Most of the columnar *Cereus* are used all over the country as live fences. They are planted closely together and make impassable fences.

Palmaceæ.—The leaves of *Attalea Cohune*, *Oreodoxa regia* *Astrocaryum mexicanum*, of several *Chamædoreæ* are used for thatching houses, lasting for many years. The stems of *Sabal* are used as very lasting posts and those of *Oreodoxa regia* are split and make beautiful boards, which take a high polish.

61. *Gramineæ*.—The dried tops of *Zea mais* (Judian corn) are used all through the Country for thatching roofs; Rice-straw is also used and several species of *Gynerium*.

Many species of *Arundo* and *Arundinaria* having very durable and elastic stems, are used in the construction of houses as scantlings, laths and fencing.

62. *Filices*.—One species of *Cyathea* not yet determined, growing in the mountains of Zongolica to the height of 40 to 50 feet, with stems of from 10 to 15 inches diameter makes very durable posts.

63. I speak here in general of all the different vines, lianes (*Bejucos*), which are used all over the country, for tying beams, rafters and scantlings, instead of using nails; also generally used in fences.

The genera and species most used are many species of *Smilax*, of *Vitis*, of *Sapindaceæ*, of *Asclepiadeæ*, and a number of others, which are more or less lasting.

Mineral matters used in the construction of buildings in the State of Veracruz, and particularly in the City of Cordoba.

In order to explain the use of the different ingredients used in constructions of all kinds, I am obliged to give a short geological description of a part of the State of Veracruz, from the Coast up to the Cordillera.

Starting from the Coast we find sandhills, formed by the action of the strong northwinds, blowing from the month of October to April and May. These sandhills nearest the coast are from 40 to 50 feet high and change their conformation, according to the more or less violence of these northers.

From these sandhills, as far as the Station of "La Purga," a distance of about 8 leagues, all is sand, the accumulation of the northers for the last 6,500 years, according to a calculation, which, I have been able to make some 15 years ago, aided by Dr. Heinemann and Dr. Hegewisch.

In one of the courtyards near the sea coast of Veracruz, on making some excavations one of the stranded carabelas of Fernando Cortes was found imbedded in the sand about 65 to 70 yards distant from the actual seashore. By making a simple proportion we find that 100 years is to 65 yards as 40,000 yards, equal to 8 leagues giving a proximate result of 6,500 years, since the sea receded from the Station of "La Purga," although probably more than double the number of years have been required.

From the Purga upwards on a subsoil of sandstone, drift is spread all the way up to Orizaba, the thickness of the same at the latter place being about 600 feet and descending to La Purga running out to two feet.

The Glacial Epoch, in all its phases, Champlain and Terrace, which generally has been considered null in tropical climates, has been more extensive and manifest, than in Northern countries.

The mountains in Mexico raised during the Jurassic Epoch did not pass from 300 to 500 feet altitude, in proof of which there exist no conglomerates, containing pebbles of a larger size and those in existence contain only fine and seldom coarser sand; besides the climate from the Jurassic to the Tertiary Epoch has been always ultra tropical, which would not have been the case, if there existed elevated mountains.

The revolution here in the State of Veracruz, during the glacial Epoch has been tremendous. The mountains, not higher than 500 feet above the sealevel rose to 12,000 and 13,000 feet, causing a polar climate, seconded by the upraising of all lands up to the North Pole and destroying in the State of Veracruz every vestige of animal and vegetable life.

Two great lakes, receiving their waters from the glaciers and icebergs of the cordillera formed the Vallies of Orizaba and Cordoba, until during the Terrace Epoch on the gradual raising of the lands, which had been sunk during the Champlain Epoch, the barriers of these lakes, founded by Cretaceous formation were broken through, forming the actual Vallies of Orizaba and Cordoba, but inundating the whole of Tierra Caliente from the Chiquihuite to near La Purga with drift. These lakes of Orizaba and Cordoba, being at the foot of the cordillera received the detritus of the glaciers and immensen umbers of icebergs coming down from the Table-land, whose vallies formed lakes. These icebergs floated down to the barriers of both lakes and were discharged into the sea which during Champlain Epoch commenced at the Chiquihuite down to La Purga. On their gradually

melting the boulders they carried were discharged all over Tierra Caliente, where they still are lying, being composed of porphyries, syenites, dolerites, diorites and basalts, but seldom of limestones, which latter have all been dissolved.

The Valley of Orizaba as also that of Cordoba is formed of drift from 200 to 600 feet depth.

This drift is generally composed of conglomerates interposed with rounded boulders of all sizes, the smaller, as the pebbles lying lowest. This is easily accounted for, as the mountains during the beginning of the Glacial Epoch were raised very gradually and the subsequent erosions were subject to the lower or higher elevation of the mountains.

The summit of the cordillera was formed of porphyries, syenites, dolerites, diorites, trachyts, basalts and limes-tones lying on old sand-stones. These porphyries, etc., overtopping during the commencement of the Glacial Epoch all other formations, were carried down tho the plains forming, the conglomerates and accounting for the above enumerated rocks of the riverbeds, which now contain all the older formations, which existed on the summit of the mountains and which by glaciers and icebergs were all carried down into the vallies.

These last named minerals form the materials, now used here in constructions.

In the whole State and particularly at Cordoba, these porphyritic, sienitic, dioritic, trachytic and basaltic boulders are used in the construction of buildings, sidewalks and pavements..

Cretaceous deposits abound throughout the State of different colours, according to the Era they belong.

Carboniferous and cretaceous limes-tones are mostly used in buildings; the former well polished are converted into beautiful marble plates for counters, grave-stones etc.; it is of a black colour and contains greatly metamorphosed fossil shells; the latter, which are of a white colour resemble the marble of Carrara in Italy, but are used here only as building materials and as flag-stones for sidewalks, which latter have the great inconvenience

of being gradually dissolved by water and carbonic acid of the atmosphere, until they become too smooth and slippery to be walked on with security.

Near Orizaba, there exist several mines of onyx (calcareous stalagmites). Tecali, which are worked on a large scale and for exportation sawed into cubes of different sizes and for home use are applied in nonuments and articles of adornement.

All lime-stones, when burnt, produce lime, even the shells of the seashore, but cretaceous lime-stone produces the best and strong-est lime. This latter lime, mixed with a coarse sand formed during the Terrace Epoch at different places, as the foot of Cerro de Gallego 4,000 feet and tho valley of Atoyac 1,500 feet above the level of the Ocean, produces a mortar equal to the best Portland Cement, drying under water in less than 48 hours.

For all constructions the silicious sands of riverbeds are exclusively used. In Orizaba they use a volcanic sand, which at the depth of from 3 to 4 yards from the surface is found in layers 40 to 60 feet deep. This sand of a bluish colour was erupted from the volcano of Orizaba (*Citlaltepelli*) for many centuries, forming layers, which show the intensity of each, according to the duration of the eruption.

Latterly, as the manufacture of bricks, tiles, etc., has been greatly perfected and reduced to one half of the cost, many buildings are constructed from bricks, instead of stones.

As tiles are liable to breakage, latterly corrugated iron has been substituted for them and is becoming more and more generalized, on account of their durability, the cost beind nearly equal in both cases.

Cordoba (Mexico), the 30th of August 1892.

HUGO FINCK.

